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ABSTRACT

In recent years there has been considerable debate about the appropriate role, management structure, and activities for the National Technical Information Service (NTIS). This background paper identifies key issues that require attention by Congress and by NTIS itself to increase the effectiveness of NTIS in the collection and dissemination of Federal scientific and technical information (STI). It begins by discussing factors that have affected the development and current status of NTIS, including an ambiguous Federal STI policy system; broad (or non-specific) enabling legislation; limited Congressional oversight; staving off privatization; and competitive and collaborative relationships with other agencies. Underlying assumptions of STI use and dissemination are then outlined and approaches to increasing the usefulness of the technical report literature are discussed. An overview of key policy issues related to the future role of NTIS in the collection and dissemination of Federal STI is presented and these issues are discussed: STI dissemination process; organization of NTIS within the Federal Government; pricing and fiscal management, and internal NTIS concerns. The paper concludes by suggesting options and strategies by which NTIS could improve its operations and its role in linking information services and products to the STI community, including ways in which NTIS could improve its self-sufficiency. (22 references) (SD)

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THE FUTURE OF THE NATIONAL TECHNICAL INFORMATION SERVICE: ISSUES AND OPTIONS

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THE FUTURE OF THE NATIONAL TECHNICAL INFORMATION SERVICE:

ISSUES AND OPTIONS

The National Technical Information Service (NTIS) is a key agency in the Federal government's efforts to collect and disseminate a range of information services and products. In recent years, there has been considerable debate about the appropriate role, management structure, and activities for NTIS. It is within the context of that debate that this background paper has been prepared for the Office of Technology Assessment (OTA).

More specifically, this background paper suggests that a number of key issues requires both Congressional attention, and attention by NTIS itself, if NTIS is to increase its effectiveness in the collection and dissemination of Federal information. There are a number of options and strategies that NTIS can consider to improve its operations and its role in linking information services and products to the scientific and technical information (STI) community. Some of these options, however, will require specific legislative intervention by Congress.

The purpose of this paper is to identify issues and actions that would enhance NTIS' ability, either by itself or in collaboration with other Federal agencies, to maximize the contribution of Federal STI to the achievement of national goals. More specifically, OTA has asked that the paper discuss possible innovative roles and responsibilities for NTIS, GPO, Federal science agencies, and Federal STI dissemination offices in improving the accessibility and usability of Federal STI.

Toward this end, the paper will draw upon key writings and the author's personal research experiences related to the management of and access to Federal STI (see Appendix A). Thus, the paper is more an essay on issues and options related to NTIS and the management of Federal STI than a formal policy

review and analysis. It is not a comprehensive review and assessment of NTIS, nor is it a review of the literature. Rather, the paper identifies key issues and suggests possible options by which NTIS could improve the accessibility and usability of Federal STI.

Throughout this paper, the term "usability" of STI will be used as an important criterion of effectiveness. Usability of Federal STI is enhanced when the following conditions are met:

- Federal collectors and disseminators of STI have identified the information needs and information gathering behaviors of specific clientele groups
- Federal STI services and products are designed in light of these information needs and information gathering behaviors
- Federal STI is organized, disseminated, and marketed in a range of formats and with various value-added features
- The STI is accurate, reliable, and has been reviewed to ensure basic levels of quality control
- Individuals in the STI community can identify and obtain STI that resolves their information needs in a timely and cost-effective basis
- Federal STI is understandable to the users and contributes directly or indirectly to their ability to accomplish specific objectives.

While other criteria, such as cost, are important considerations, greater attention must be given to usability criteria if Federal STI is to better assist in the accomplishment of national goals.

CONTEXT

In discussing future roles and options for NTIS, it is important to recognize a number of key factors that have affected its development and current status. These factors should be considered in any assessment of future roles for NTIS.

Ambiguous Federal STI Policy System

The early history of NTIS reflects the confusion and unclear intentions of what, exactly, such an agency is supposed to do. Although NTIS was established in 1970 by an Act of Congress (PL 81-776 and Department of Commerce Organization Orders 30.7A and 30.7B), origins of the agency date back to 1945 and the appearance of the Office of the Publication Board, which then evolved into the Office of Technical Services, and then the Clearinghouse for Federal Scientific and Technical Information, and finally, in 1970 the Clearinghouse being merged into NTIS (McClure, Hernon, and Purcell, 1986).

During hearings in 1987, Congressman Doug Walgren stated that Federal policy governing STI was in disarray and lamented the current state of Federal STI policies (Congress, 1987). Evidence suggests that Federal STI policy since 1945 has been uncoordinated, ambiguous, and largely ineffective in accomplishing national goals (Bishop and Fellows, 1989).

In summary , NTIS evolved through a number of organizational settings, each with a different mission and a different role regarding STI collection and dissemination. This evolution reflects the ongoing confusion and debate about appropriate Federal roles and responsibilities regarding the collection and dissemination of STI. One must remember that it is within this confusing, ambiguous, and uncoordinated policy system that NTIS operates.

Broad (or Non-specific) Enabling Legislation

NTIS is one of a number of Federal agencies charged with the responsibility of collecting, announcing, and disseminating a broad range of information. More specifically, NTIS is to (5 USC 1152):

- o search for, collect, classify, coordinate, integrate, record, and catalog such information from whatever sources, foreign and domestic, that may be available
- o make such information available to industry and business to State and local governments, to other agencies of the Federal government, and to the general public, through the preparation of abstracts, digests, translations, bibliographies, indexes, and microfilm and other reproductions, for distribution either directly or by utilization of business, trade, technical, and scientific publications and services.

The statutory charge for NTIS to serve as a clearinghouse for the distribution of scientific and technical information (STI) is broad.. Indeed, the limited statutory specification of mission, activities, and responsibilities allows NTIS much latitude in choosing what it does and how to do it.

This non-specific statutory basis of NTIS has received inadequate attention. While some might argue that the statutory basis provides great latitude and flexibility for NTIS, others might argue that it is a root cause of NTIS' unfocused mission, the disparate set of programs and activities NTIS administers, the overlap of responsibilities between NTIS and other STI collectors/disseminators, and the inability of Congressional committees to conduct meaningful oversight of NTIS.

Limited Congressional Oversight

Over the years, it can be argued, there has been minimal direct Congressional involvement and direction for clarifying and coordinating the role of NTIS within the Federal government. There has also been minimal formal review and assessment of the agency's performance--especially in terms of the degree to which specific objectives are accomplished, with what costs, and with what impacts. Congressional interest in NTIS has been in the context of saving it from privatization--less in providing direction or assessing overall performance.

Staving Off Privatization

An ongoing issue for NTIS has been whether the agency should be privatized. The privatization issue has surfaced a number of times during the agency's history and most recently during 1986-1988. Efforts to privatize NTIS are likely to have had the following negative impacts:

- NTIS administrators have had to deal with a highly charged political environment, taking attention away from operational matters
- NTIS resources, energy, and staff time have been redirected to organizational survival rather than service provision and assessment
- The credibility of the agency in the eyes of many users has been damaged due to charges made about the effectiveness of NTIS during the various privatization debates
- NTIS' ability to engage effectively in long range planning has been injured, which then mitigates other agency's enthusiasm to develop cooperative programs and projects with NTIS.

In short, NTIS is just now recovering from the latest privatization efforts and is attempting to respond to Congressional directives outlined in PL 100-519 (1988), which basically ended this round of privatization debates.

Competitive/Collaborative Relationships with Other Agencies

NTIS has a complex relationship with other Federal agencies--one that encourages, paradoxically, both competitive and collaborative relationships. For example, NTIS and the Government Printing Office (GPO) compete to obtain publications from the same executive branch agencies. There is no statutory requirement for NTIS and GPO to coordinate activities or services.

On the other hand, NTIS has attempted to develop cooperative relationships in the collection and dissemination of STI with, most notably, the Defense Technical Information Service (DTIC) and the Department of Energy, Office of Scientific and Technical Information (OSTI). Yet even these "cooperative" relationships stem primarily from NTIS' need to obtain external revenues in order to meet its requirements for self-sufficiency.

This Janus-like basis of NTIS' relationships with other Federal agencies complicates the image it projects to both users and other Federal agencies. Moreover, it may be unclear to NTIS staff when the collaborative role versus the competitive role is appropriate in specific situations. Further, the collaborative role is seen as appropriate primarily when it benefits NTIS' self-sufficiency mandate and <u>not</u> when it might benefit the public good or larger national goals.

Importance of Context

There are other contextual factors that could be considered in discussing the future of NTIS, e.g., changing priorities and policies of various administrations regarding STI over the years. The point is, however, that any review of future roles and opportunities for NTIS must consider the historical development and context in which NTIS currently operates.

UNDERLYING ASSUMPTIONS OF STI USE AND DISSEMINATION

Within the context outlined above, NTIS (as part of the Federal STI policy system) has developed its information services and products on the basis of questionable assumptions related to STI use and dissemination (McClure, 1989). Two key concerns here are the development of a user-based model of STI collection and dissemination, and increasing the usefulness of the technical report literature. Resolving these two concerns is central to the future success of NTIS and the "usability" of the STI this agency manages.

Developing User-Based Models of STI Collection and Dissemination

Figure 1 depicts the traditional model of Federal STI collection and dissemination. Generally, basic "steps" are followed:

1. Research is conducted, producing STI
2. STI is submitted to NTIS
3. STI is controlled bibliographically and physically
4. NTIS announces the availability of the STI through various indexes, services, and products.

This view of STI collection and dissemination is a linear model that fails to account for or accommodate user information needs and information gathering behaviors. Worse, it presents a passive model that requires users to take the initiative to "find out about" NTIS and its services as a prerequisite for using or acquiring the information.

Figure 1 also depicts a simplified user-based model of STI collection and dissemination. Generalizing once again, this view begins by considering (1) the STI needed for problem solving by specific clientele groups, and (2) how the needs of users should drive the entire STI collection/dissemination process. This model is not linear and recognizes that individual scientists and researchers may approach information seeking differently.

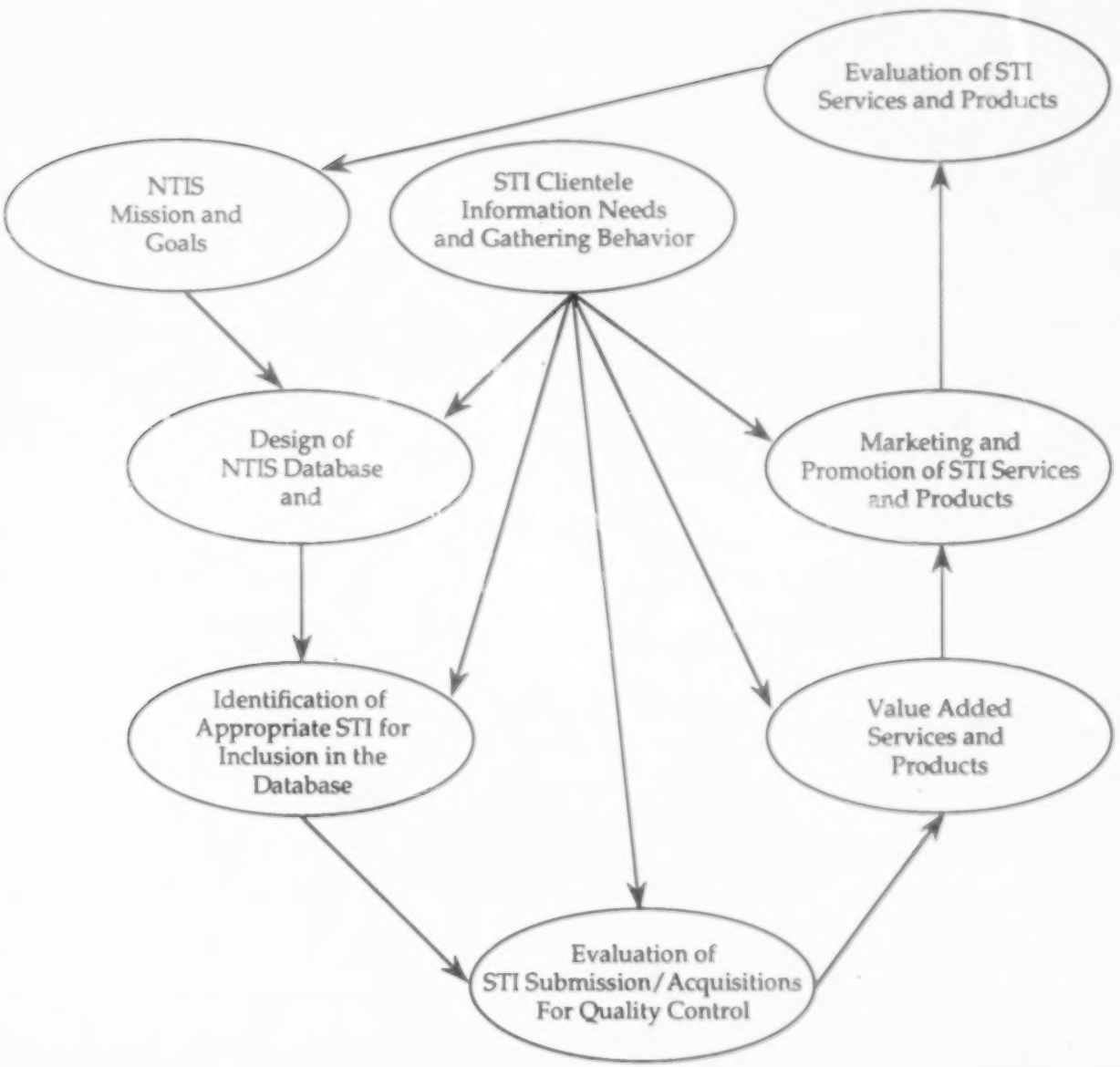
Figure 1

Models of STI Dissemination

A. Traditional Model

Researcher Produces STI → NTIS Acquires STI → NTIS Controls STI Bibliographi-callyand Physically → NTIS Announces Availability of STI

B. User-Based Model


Evaluation of STI Services and Products
NTIS Mission and Goals
STI Clientele Information Needs and Gathering Behavior
Design of NTIS Database and
Marketing and Promotion of STI Services and Products
Identification of Appropriate STI for Inclusion in the Database
Value Added Services and Products
Evaluation of STI Submission/Acquisitions For Quality Control

The traditional model fails to consider the importance of directly linking the information to the information need. For example, the agricultural extension agent model of STI collection and dissemination has been shown to be one of the most successful approaches for increasing the usability of information. The extension agent model relies on the presence of an intermediary who knows both the information sources and the information needs of the user. Perhaps most importantly, the transfer of information typically occurs in the user's setting--in a context of specific problem solving of interest and importance to the user.

Many of the existing NTIS dissemination techniques are based on the traditional model described in Figure 1. For example, announcing the availability of research reports in Government Reports Announcements & Index (GRA&I) is far less effective than (1) determining what audiences need what types of STI, and (2) disseminating that information to the user through trained intermediaries knowledgeable about both NTIS services and the subject area of the user.

Increasing the Usefulness of Technical Report Literature

The primary information product of NTIS is the technical report. The vast majority of the 68,000 items added to the NTIS collection in 1988 were technical reports (NTIS, 1989a, p. 3). While much of the U.S. R&D is reported through technical reports, there are difficulties with the technical report as a dissemination vehicle. Technical reports

- are not refereed
- represent varying degrees of quality and readability
- may not be identified and obtained for inclusion in the NTIS database (and NTIS has no authority to require that the reports be submitted)

- o appear typically in a mimeo format and may be hard to read due to quality of print, figures, etc.
- o can be contractor reports and "key" findings or information may not be included for proprietary reasons.

These and other problems involving the over-reliance on technical reports for STI dissemination are detailed elsewhere (McClure, 1988).

The NTIS model of Federal STI dissemination is to collect and announce these technical reports in hopes that someone will (1) think to search the NTIS database for such a report, and (2) then find a report that meets his/her information need. But only a handful of the reports are ever purchased (either in fiche or paper) and sales of these reports have been trending downward consistently over the past several years.

In short, NTIS must confront some serious problems regarding its reliance on technical reports as the primary mechanism for both collecting and disseminating STI. These problems affect finances (declining sales of the reports and increasing costs to store and organize them), and effectiveness (the degree to which researchers and scientists rely on and use the reports).

Options available for dealing with this issue revolve around three primary approaches. The first is for NTIS to continue developing various value-added services and products related to the technical reports. However, the value-added services and products should focus on better access to the information content in the reports for specific target audiences and not simply on supplying more or better announcements of the report literature.

The second option is to obtain authority that (1) requires the deposit of reports of Federally funded projects to NTIS and (2) grants NTIS or some other agency the means to enforce the requirement. As it is, NTIS must rely on the good-will of researchers and agencies to obtain reports and has virtually no

means to enforce or require submission of reports. Regulations, procedures, and sanctions can be developed to deal with this problem.

A third option is for NTIS to develop approaches for increasing the quality of the technical reports. An American National Standards Institute standard has been suggested for technical reports (ANSI Z39.18-1987). But the standard is useless unless it is enforced. NTIS may wish to move toward ensuring the quality control and review of submitted technical reports, but currently, there is no enforcement of the ANSI standards.

Moving Away from Traditional STI Dissemination Models

Garvey, in his classic work, stated that communication is the essence of science (1979). The scientific communication process is not uni-directional, it is not linear, nor is it based primarily on printed documents. It is based on the law of "least effort," is multi-faceted, employs extensive feedback loops, relies primarily on interpersonal interactions, and is problem/decision oriented and not topic/discipline based. Federal STI collection and dissemination techniques must move away from the traditional and passive models described above.

NTIS must recognize that the ability to store massive amounts of STI on a machine readable data file or CD-ROM, for example, does not assure effective access to and use of that STI. Most scientists and researchers believe that they are overloaded with information sources. What they need is synthesized information (knowledge) about a particular problem or research area. New models for organizing and disseminating STI to meet such needs must be developed before large data centers (such as NTIS) evolve into data cemeteries.

Currently, the Federal STI collection and dissemination process (and the policies and procedures that support that process) fail to consider user information needs and information gathering behaviors. Until Federal policymakers recognize that (1) STI collection and dissemination techniques, and (2) the handling of the technical report literature is based on inappropriate assumptions about how researchers' and scientists' acquisition and use of STI, Federal STI will be inadequately exploited to accomplish national goals.

STRUCTURAL AND ORGANIZATIONAL ISSUES

The future role and means to improve the effectiveness of NTIS can also be considered in terms of the structure in which Federal STI disseminators are organized, the relationships between and among NTIS and these various agencies, and the organizational structure within NTIS.

Need for a Central STI Coordinating Agency

The issue here is that currently there is no Federal agency that provides centralized planning and coordination of the government's various STI collection and dissemination activities. The major collectors/disseminators of STI include:

- National Aeronautics and Space Administration (NASA)
- Department of Energy, Office of Scientific and Technical Information (DOE-OSTI)
- Defense Technical Information Center (DTIC)
- National Library of Medicine (NLM)
- National Technical Information Service (NTIS)
- Government Printing Office (GPO).

In addition, other agencies such as the Geological Survey, the National

Oceanic and Atmospheric Administration, the Environmental Protection Agency (to name but a few) are also actively engaged in the collection and dissemination of STI.

The recent OTA staff paper Federal Scientific and Technical Information in an Electronic Age: Opportunities and challenges (1989, p. 31) argues for a stronger leadership role from the Office of Science and Technology Policy (OSTP) in STI collection and dissemination policy. Is lack of specific statutory direction for such a role and the likelihood that OSTP will attach importance only to those items on each administration's political agenda, makes it unlikely that OSTP could take an effective and ongoing role in STI policy development.

Congress should consider the options of (1) establishing an Executive branch agency specifically charged with the responsibility for coordinating and developing Federal STI collection/dissemination, or (2) specifying such responsibilities for an appropriate agency already in existence. The key point is that Congress will have to enact legislation to accomplish this objective. Until it is clear that there is one agency responsible for the coordination and development of both STI policy and the collection/dissemination of STI, it will continue to be impossible to conduct meaningful oversight on the process.

Clearly, STI collection and dissemination is decentralized and is likely to remain that way for the foreseeable future. Nonetheless, a central agency to coordinate policy and procedures should be superimposed on this process. Until such a central coordinating agency exists, it is likely that turf protection will be a major agency objective rather than cooperative and coordinated activities.

Relationships among Federal STI Collectors and Disseminators

Currently, there are more barriers than rewards for the coordination of activities among STI collectors and disseminators. As suggested earlier in this paper, NTIS and the other agencies, both compete and collaborate with each other. But the bottom line for NTIS is to be self-sufficient, and the bottom line for the other STI collectors and disseminators is to facilitate the accomplishment of their agency mission.

The CENDI group (NTIS, NLM, DOE-OSTI, DTIC, and NASA) should be congratulated for working together and trying to better coordinate their activities. However, the long term effectiveness of this group will be limited for the following reasons:

- o CENDI has minimal financial support
- o Agencies participate in CENDI on a volunteer basis
- o A number of major STI collectors/disseminators are not represented in the group
- o Existing participants have differing views on the goals and appropriate activities that CENDI should address
- o The missions of the cooperating agencies vary significantly
- o There is no authority to enforce decisions or ensure that either these agencies or others outside the CENDI group implement CENDI suggestions or decisions.

One possible option is to reshape the group into a statutory-based agency, with a regular appropriation, and to clarify its purpose and responsibilities regarding STI collection and dissemination.

Over the short term, NTIS' relationships with other STI collectors and disseminators might be improved by considering the following options:

- Joint Production of Information Services and Products. A number of the information services and products produced by the STI collections and disseminators could be produced together under single contracting arrangements. Or, instead of all the various STI collectors and disseminators having to obtain each new wave of information technologies, there could be one agency responsible for the production of all Federal STI.
- Centralized Distribution of STI. Currently there is no central location for the distribution of Federal STI. There are numerous agencies from which the STI might be obtained. While the GPO may have been originally envisioned to serve such a role, it has not done so. One agency could serve as the focal point for the distribution of all Federal STI.
- Combine Indexes and Bibliographic Finding Aids. A central problem for the STI community is not knowing which STI collector/disseminator has what STI. Combined indexes and finding aids among NTIS, DOE-OSTI, USGS, EPA, NASA, etc. would greatly enhance the users ability to have a "one stop" source for locating Federal STI.
- Establish a STI Depository Program. The GPO depository library program is not specifically targeted at the STI community. STI collectors and disseminators could design a depository program where core STI materials from the various agencies are deposited in a range of settings, and clientele groups could then select additional information sources of special interest to them.

At best, these and similar options are "stop gap" solutions to improving the

usability to Federal STI. Over the long term, Congress needs to establish a specific lead agency to coordinate the collection and dissemination of Federal STI. Until this is done, relationships among the various STI collectors and disseminators will be ambiguous and competitive.

Relationship Between NTIS and GPO

A 1979 paper titled "Where Goest Thou NTIS and GPO" identified a number of issues and problems regarding the relationship between NTIS and GPO, concluding that it was the users who suffered most from the inability of NTIS and GPO to better coordinate their activities (McClure, 1979). Now, a decade later, many of the same problems remain. Complicating the relationship is the fact that sections of Title 44 USC related to the GPO and the Depository Library Program (DLP) need revision and updating.

The GPO claims that 90% of the items distributed to depository libraries and 72% of the sales publications are STI (Congress, 1987, p. 368). Even allowing for some exaggeration in these claims, it is clear that the GPO does disseminate a broad range of STI and must be included in Federal policymakers' assessment of the collection and dissemination of government STI.

The most recent discussion of the role of NTIS and its relationship to GPO appeared in Informing the Nation, Chapter 5, "An Electronic National Technical Information Service and NTIS/Superintendent of Documents Cooperation," and Chapter 12, "Setting Future Directions for the Superintendent of Documents and National Technical Information Service" (OTA, 1988). However, the various proposals put forth in these two chapters have yet to receive adequate, and serious attention from either policymakers or from the information community.

Moreover, the assessment of the NTIS/GPO proposals put forth in Informing the Nation considered implications in four areas: government productivity,

agency missions, private sector economy, and other areas (1988, p. 309). Interestingly, the discussion did not consider:

- how each proposal would affect the effectiveness and efficiency with which users acquired and used STI
- how libraries would or could respond to the various changes outlined in the proposals
- the degree to which the proposals increased the "usability" of Federal STI or otherwise would enhance the accomplishment of national goals.

Nonetheless, the proposals put forth in Informing the Nation as well as the proposal offered in Federal Scientific and Technical Information in an Electronic Age (OTA, 1989, p. 28), deserve careful review and discussion among the various interested stakeholders.

In the short term, a number of strategies could be considered to better coordinate GPO and NTIS activities. These include the following:

- Formalize Joint GPO/NTIS Cooperation and Planning. Currently there are no regulations or requirements that GPO and NTIS jointly plan or review their various programs with an eye toward either reducing overall cost to the government or improving access to STI users. Indeed, each has different Congressional oversight committees. Congress could ask GPO and NTIS to submit, by a certain date, a plan for coordinating and improving the dissemination of STI.
- Distribute NTIS material through the Depository Library Program (DLP). There are numerous ways in which this could be accomplished to the betterment of user access to STI. For example, a core collection of NTIS materials (McClure and Hernon, 1986) could be disseminated to the regionals or other depository libraries. Alternatively, a voucher system could allow some of the depositories to obtain those NTIS materials most appropriate for their particular library situation.

- o Establish a joint NTIS/GPO STI Depository Program. Except for some academic libraries, the existing GPO DLP does not specifically distribute STI to libraries and private sector institutions that are most likely to use, or need, that STI. To promote the accomplishment of national goals related to competitiveness and economic development, Federal STI needs to be regularly disseminated to the STI community.
- o Sell NTIS publications and products through the GPO Bookstores. The GPO bookstore program offers an excellent opportunity for NTIS to sell selected publications and products to the public at large; this strategy would also increase NTIS' visibility as a Federal information broker.
- o Establish a combined index and catalog to NTIS/GPO information sources. Private sector firms should be encouraged to explore the development of combined indexes and finding aids to NTIS/GPO information sources. GPO and NTIS constitute the two largest disseminators of government information, yet each has separate indexes, catalogs, and finding aids.
- o Coordinate Selected Activities. To what degree can printing, purchase and use of information handling technologies, marketing, distribution of materials, and other activities be coordinated? In which instances might there be cost savings or improved access and use of STI? Policymakers have not explored these options, have not requested studies that provide data to answer these questions, nor have they asked NTIS/GPO to seriously consider coordinating various activities.

While these are short term strategies, longer term proposals such as those described by OTA offer great potential for improving the relationship between NTIS and GPO and increasing the usability of Federal STI. Clearly, however,

there are a number of areas where greater cooperation and coordination between the two agencies can occur. Congress may have to mandate that such cooperation and coordination occur if it is to happen in fact.

To this writer's knowledge, no formal research (including cost-benefit analysis, and impact assessment) has been undertaken to determine the (1) effectiveness with which GPO could assume NTIS responsibilities, (2) the responsibilities and duties that could be combined between the two agencies, or (3) the effectiveness with which NTIS could assume GPO responsibilities. Such research is needed so that policy decisions can be based on rational decision making and meeting user needs rather than on ideology.

Relationship Between NTIS and the Private Sector

NTIS also finds itself in a complex relationship with the private sector. Various pieces of legislation (most recently PL 100-519) encourage NTIS to contract to the private sector appropriate services and activities. Paradoxically, the agency must provide high quality services and products, but not so high quality and profitable that they become candidates for privatization or being contracted out to private vendors.

Testimony from spokespersons for the Information Industry Association did not support the privatization of NTIS (Congress, 1987, p. 131-149), but proposed instead "partnerships" between NTIS and the private sector for specific areas of operations and activities. But "successful partnerships" would likely take those programs that are most successful and with the greatest potential for profit and leave the others. In short, NTIS is aware that the private sector watches NTIS programs and activities closely to (1) ensure that NTIS does not engage in unfair competition with the private sector, and (2) ensure that those areas of NTIS activities that can be contracted out, are contracted out.

NTIS has initiated a program of joint ventures with private firms "to assist in making results of U.S. government R&D available to industry, business, and the general public" (NTIS, 1989a, p. 4). "Joint Ventures Program Establishment" (1989) provides additional information about the initiative. While the objectives of the program are laudable, key policy issues remain:

- Who owns what specific products and services that result from the joint venture?
- To what degree does the government control or have a say in controlling the information products and services developed as a result of the joint venture?
- Will private sector firms have a monopoly over certain types of NTIS information services and products for which the public may then have to (in effect) pay twice?
- Given the increasing internationalization of information, how can NTIS ensure that the joint venture benefits the United States rather than foreign companies?
- Since only those joint ventures that generate revenue for NTIS will be supported ("Joint Ventures Program Establishment," 1989, p. 25149, B.3), joint ventures that *only* enhance the public good and the overall usability of STI will not be developed.

The movement of NTIS into joint ventures with the private sector raises a number of issues, the implications of which are still unclear in terms of increasing the usability of STI. These issues and implications should be carefully reviewed by Congress as it considers legislation to define and refine the future role of NTIS.

NTIS is a unique agency in the Federal government. It is asked to operate largely as a private corporation that must, at least, break even but it cannot compete directly with existing private sector services or products. It is asked to be innovative and develop new products and services, but it must suffer the bureaucratic and political constraints common to any government operation.

In short, NTIS is neither fish nor foul as either a government agency or a private corporation--it has the limitations of both and the benefits of neither. Given this situation, its relationship with the private sector is ambiguous and limited largely to that of serving primarily as a conduit to award various types of contracts.

NTIS as a Clearinghouse

The clearinghouse function of NTIS is established by statute (5 USC 1152). But since NTIS receives no regular appropriation, the degree to which it can operate as a true clearinghouse is questionable. Thus, the model NTIS uses for its clearinghouse requires updating and revision.

The concept of a Federal information clearinghouse is not well understood. Minimally, a clearinghouse:

- Serves as a repository for publications on subjects defined as falling within the scope of its acquisitions policy
- Actively solicits publications that fit its subject profile
- Evaluates the publications it has received to determine whether or not their quality and significance merits their inclusion in the collection
- Provides mechanisms for the announcement of publications and targets those announcements to specific user groups

- o Actively engages in a range of dissemination processes and adds value to this dissemination process for specific user groups
- o Actively markets and promotes its information services and products and educates its clientele on how best to exploit the clearinghouse
- o Hires and supports effective intermediaries who link the services the products of the clearinghouse to the actual users.

While NTIS engages in some of these activities to a greater or lesser extent, it has not carefully defined its areas of subject interest, it passively receives and includes most of the material submitted to it, it exercises minimal to no quality control over the submissions, and unlike the ERIC clearinghouse model, it employs no agencies or groups that are charged with specific responsibility for collecting and disseminating in specific subject areas.

Space does not permit a detailed comparison and assessment of NTIS and ERIC as information clearinghouses. However, one could argue that the ERIC model is more successful, provides more and better services to its clientele, works "in the field" with its clientele on applications and uses of ERIC information sources, actively acquires and controls its input, and markets its services much more effectively than does NTIS (Horn and Clements, 1989).

A direct comparison between NTIS and ERIC as clearinghouses is likely to identify a range of suggestions and strategies that NTIS might consider to improve its effectiveness, for example:

- o establishing a national network of clearinghouses with responsibility for specific subject areas; these clearinghouses would actively collect appropriate information sources, evaluate those sources, and market services to specific clientele

- o synthesizing and assessing the information sources in its database rather than simply announce their presence
- o working directly with its end-users as well as training intermediaries to work with those end-users.

These are but a few possible strategies. The issue is that NTIS operates as a clearinghouse more in name than in fact. A reassessment of how NTIS can be re-organized to better meet the criteria for being a true information clearinghouse should be undertaken as soon as possible.

Improving NTIS Organization and Structure

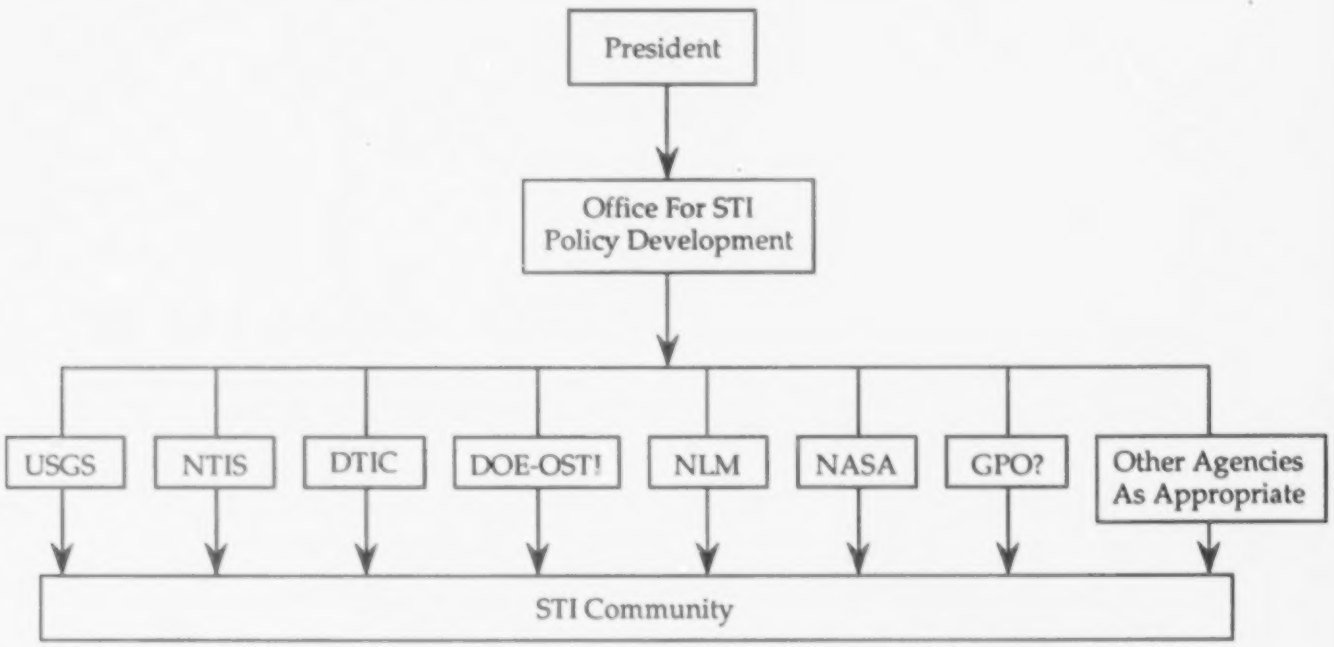
Ongoing debates about the "best" organizational structure and location for NTIS in or out of the Government have plagued NTIS over the years. An Assessment of Alternative Organizational Structures for the National Technical Information Service (1987) concluded that NTIS should be re-organized as a government corporation. The recommendations have not been acted upon, but the implication of this, and other studies, is that more discussion has occurred about where NTIS should be located (Government, private sector, government corporation) than about how all the various STI collectors/disseminators can, on a program basis, improve the usability of Federal STI.

Figure 2 offers two possible models to better organize Federal STI collection and dissemination. Option 1 is a Centrally Coordinated and Decentrally Operated STI structure. A new or redefined agency is given specific Congressional direction to coordinate STI Policy among the various STI collection and dissemination agencies. This agency would have responsibility to develop and implement STI policies, coordinate the various STI collectors and disseminators, and find areas where the agencies can better cooperate.

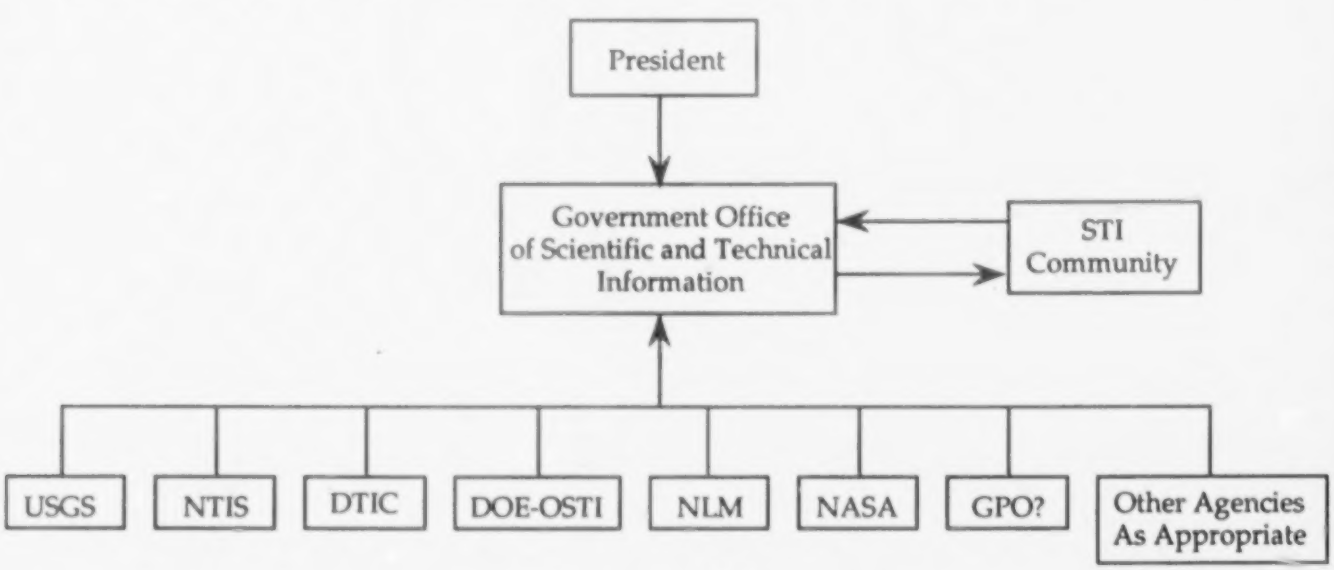
Figure 2

Possible Models For Federal STI Organization

1. Centrally Coordinated, Decentrally Operated



2. Central STI Agency For Publication/Dissemination/Sales



Option 2 of Figure 2 is a Central STI agency for Publication, Dissemination, and Sale of STI. In this model, the various STI collectors and disseminators would transfer their publication, dissemination, and sales activities to a central office but retain other STI program management activities for their individual departments. The Government Office of Scientific and Technical Information would also have responsibility for STI policy coordination and could be a "one-stop" STI service center for the STI community.

Both options place coordination for STI in an independent regulatory agency reporting to the President. The standard model for the creation and operation of an independent regulatory agency could be used. Option 1 would require less structural change than Option 2, but Option 2 has greater potential for both cost savings across government and improving the usability of STI to the scientific community. It may be possible to develop Option 1 as a first step for improving the usability of STI and moving to Option 2 as a second step.

These options are offered to suggest that a number of organizational approaches are possible to better organize Federal STI. Additional study of these or other options would be needed. But, clearly, Congressional guidance is needed to clarify the responsibilities and roles of NTIS vis a vis other STI collectors and disseminators. More specifically, centralized planning and coordinating of STI collectors/disseminators is needed. Closer links between NTIS and GPO, in terms of joint planning and projects, should be investigated both for possible cost savings as well as for improving access to and the usability of Federal STI. Finally, NTIS is not organized to operate as a true information clearinghouse. These organizational and structural issues limit the overall effectiveness and impact of NTIS.

FISCAL MANAGEMENT

NTIS finds itself trying to resolve two key contradictory situations regarding fiscal management:

- On one hand, NTIS is to provide for the public good and enhance the usability of STI, and on the other, it treats STI as a commodity to be bought and sold by those individuals or organizations who are able to pay the going rate. Champney (1988) discusses various models for how this apparent contradiction might be resolved.
- While Congress has dictated that sales and other revenues cover agency expenses, it also continues to burden NTIS with an increasing number of programs and responsibilities in the collection and dissemination of STI.

These two contradictory situations force NTIS into roles and programs that limit its effectiveness as a collector and disseminator of STI. As a result, there are a number of related issues requiring attention under the broad rubric of fiscal management.

Pricing Policies

NTIS policies for pricing and costing of services require additional attention and research. An ongoing debate between the agency and its clientele about "excessive" costs for NTIS services and products has dogged the agency over recent years. Indeed, the 1988 authorization act for NTIS (PL 100-519) states:

> Within 90 days after the date of the enactment of this Act, the Secretary of Commerce shall submit to the Congress a report on the current fee structure of the Service, including an explanation of the basis for the fees, taking into consideration all applicable costs, and adequacy of the

> fees, along with reasons for the declining sales at the Service of scientific, technical, and engineering publications. Such report shall explain any actions planned or taken to increase such sales at reasonable fees.

The rationale provided by NTIS in this report would be most interesting to assess; this writer, however, has been unable to obtain a copy of the report. NTIS cannot develop user fees and pricing policies for information services and products in a vacuum. Laska has summarized the various statutes, (e.g., 31 USC 9701), Office of Management and Budget Circulars, and other regulations related to this issue. He concludes that (1989, p. 119):

> The costs of establishing a user fee program and for the collection and maintenance of a fee system would be substantial. In some cases, such a system cannot be justified in terms of the mission of the agency and the needs of its constituencies. User fees may comprise a major barrier to the fulfillment of an agency's programs.

Further, the Office of Management and Budget (OMB) in various policy circulars such as A-25 (1959 amended 1964), A-130 (1985), and the "Second Advance Notice of Further Policy Development on Dissemination of Information" (1989) have specified guidelines for user fees and pricing policies. The "Second Advance Notice" states (p. 25558):

> OMB proposed a ceiling on charges for information products, asserting that with relatively rare exception, user charges for government information products should never be higher than a level sufficient to recover costs of disseminating, not collecting the information.

This notice goes on to state that "agencies would be precluded from using information products as a profit center or budgeting mechanism" (p. 25558). The degree to which NTIS follows these and other guidelines in determining user fees and the pricing of services and products is unclear.

For many NTIS users, there is both the perception and the reality that prices are high. For example, this writer was notified of a 65 page spiral bound report recently issued by the National Academy of Public Administration (NAPA), "The Effects of Electronic Recordkeeping on the Historical Record of the U.S. Government." Through early Fall, 1989, the report could be purchased through NAPA for $3.50. In late Fall, 1989, distribution of the report became the responsibility of NTIS, which sold the papercopy of the report (PB89-152219) for $15.95 and the technical appendix (PB89-152227) for another $21.95. NTIS clientele find such prices excessive and fail to understand the policies by which they are computed.

Thus, sales of various NTIS publications are likely to be limited for two reasons (1) excessive pricing, and (2) original (and cheaper) distribution by the issuing agency prior to the report being available only through NTIS. Thus, NTIS is in a vicious circle in terms of generating income from such items.

The basis by which NTIS prices its products and services is unclear to many users. The degree to which NTIS pricing policies are compatible with other Federal pricing policies for information services and products requires additional attention. The self-sufficiency policy mandated by Congress appears to limit the usability of STI that NTIS collects and disseminates.

Knowledge of Costs, Sales, and Expenditures

One portion of a study this author conducted for NTIS in 1985-1986, Linking The U.S. National Technical Information Service with Academic and Public Libraries, required a cost analysis of various types of NTIS sales items broken down by various client groups. At the time, NTIS was unable to produce detailed cost and sales figures--despite heroic efforts on the part of a number of NTIS staff. As a result, that study recommended that NTIS design

and implement an information system that could better track the range of NTIS costs, expenditures, and sales (McClure, Hernon, and Purcell, 1986, pp. 129-151.

In recent interviews with staff on the House Committee on Science, Space, and Technology (which has primary oversight for NTIS), it was disclosed that a recent audit of NTIS identified a significant shortfall for FY 1989. Moreover, it was unclear what caused the shortfall. While this writer is not privy to internal NTIS or Congressional materials, it appears that NTIS may need to strengthen its accounting procedures and develop more complete and detailed knowledge about costs and expenditures.

It is essential that NTIS has tighter control over accounting matters, that it identifies existing and forecast future sales for specific services and products for specific clientele groups, and that it determines the "profitability" of each produce or service. Such information is needed not only for audit purposes but also for formulating effective strategic and marketing plans.

Congressional Appropriation

The Congressional requirement for NTIS self-sufficiency is detrimental to the Agency's ability to collect and disseminate usable STI because:

- the "bottom line" mentality is cost-driven, not user driven
- it encourages excessive pricing policies
- it forces the agency to take on programs and activities that may contribute less to the mission of collecting/disseminating usable STI and more to generating income.

Further, there is a difference between making an agency self-sufficient or requiring a program of the agency to recover costs. The GPO is not self-sufficient, but its sales program is intended to recover costs.

It is unrealistic for NTIS to accomplish complete self sufficiency and, at the same time, be an effective collector and disseminator of Federal STI. Further, it is unrealistic to expect NTIS to recover costs for on-going expenditures related to such activities as maintenance of the archival database, inputting of data in the database, and other related activities.

The cost-recovery mentality at NTIS injures its ability to accomplish other objectives successfully--such as marketing, developing innovative dissemination programs, or developing new products. The primary organizational effort must be dedicated to "the bottom line." Every organization must be able to set aside some resources for internal R&D and program development and evaluation. The degree to which NTIS is able to do this is unclear.

Congress should consider a regular appropriation for NTIS to cover some of the costs associated with maintaining the archival database of STI. This maintenance function is shouldered entirely by NTIS despite the fact that it serves as an archive for the entire Federal government. Additional research can identify what costs are associated with this function. NTIS could then receive appropriations for that portion of its activities and recover costs for its sales program.

INTERNAL NTIS ISSUES AND CONCERNS

The effectiveness of NTIS as a collector and disseminator of Federal STI is also linked to a range of issues unique to NTIS as opposed to those that are related to broader Federal policy or relationships with other agencies. Yet these issues hinder the agency's effectiveness and limit the degree to which Federal STI is usable.

Unfocused Mission and Activities

NTIS has competing missions. For example, it has responsibilities for archival/repository activities, clearinghouse activities, generating money, transferring both STI and technology to the private sector, and developing value added services and products for its STI clientele. At times, resulting activities from these various responsibilities are mutually exclusive.

The breadth of NTIS' enabling legislation allows the agency to engage in a very broad range of activities. In addition to its basic charge to operate a clearinghouse for Federal STI, Congress and NTIS have seen fit to expand NTIS responsibilities for a range of additional programs, including:

- o Japanese Literature Access and Translation (PL 99-382)
- o Patent Rights and Licensing
- o Project Stride [Foreign Technology Monitoring] (EO 12591)
- o Federal Research in Progress Database (FEDRIP)
- o Center for Utilization of Federal Technology
- o Federal Software Programs
- o International Agreements for Foreign STI.

These are but a few of the agency's responsibilities. Indeed, the 1988 Omnibus Trade and Competitiveness Act (PL 100-418) requires NTIS to operate a Clearinghouse on Education and Training Materials for the Department of Education!

Since NTIS was given responsibilities for operating a clearinghouse for Federal STI (no small task in itself) a grab bag of additional responsibilities has been laid at its feet. This situation, combined with the lack of a regular appropriation to operate the agency, has encouraged NTIS to become all things to all people--especially if a new program has the potential

for generating income. A comprehensive legislative review and assessment is needed to identify the various legislated responsibilities of NTIS.

In short, NTIS has evolved into an organization that operates an extensive range of unfocused programs and services that support a mission of self-sufficiency rather than meeting specific goals related to increasing the usability and impact of Federal STI. Given the Congress' mandate for NTIS self-sufficiency, and Congress' ongoing attachment of new responsibilities to the agency, one should not be surprised that NTIS' programs and goals are diffuse and unfocused. What is surprising, however, is that NTIS operates these programs as well as it does.

Planning and Evaluation of NTIS Programs

As suggested earlier in this paper, the recent privatization efforts have not been conducive to NTIS planning. While this situation is understandable, it also can be argued that in such situations, planning and evaluation of NTIS activities takes on increased importance. Evidence from publicly available government information (and not internal NTIS documents), however, suggests that NTIS could profit by developing a carefully crafted strategic plan.

The evidence related to limited NTIS planning activities includes a directive in PL 100-519, requiring NTIS to submit an annual report that includes, among other things, a modernization plan. Efforts on the part of this author to obtain annual reports for NTIS or formal planning documents with goals, objectives, and programs prior to 1988 were unsuccessful. Thus, is the 1988 annual report (NTIS, 1989a), the first such formal annual report submitted by NTIS to Congress? The NTIS modernization plan, NTIS 2000, (NTIS, 1989b) includes much of the same material that is in the 1988 annual report.

While both the 1988 annual report and the modernization plan are good "first steps" in developing planning/reporting/evaluation documents, there are

serious limitations in each. The 1988 annual report is at best a brief overview of NTIS operations and activities--more useful information is contained in various NTIS brochures, e.g., Products & Services Catalog and Guide to NTIS.

Reprints of the actual enabling legislation and other statutory bases for NTIS is not included. A listing of key NTIS personnel and an organization chart is not present. The discussion of current activities is superficial; the sales and cost data are inadequate and not linked to specific products, services, and clientele groups; and the 23 page mimeo lacks figures and graphics and is generally unattractive. Further, the "Long Range Plan for Improvements and Modernization" (pp. 10-23) is more a listing of goals than a plan with implementation strategies, performance measures, and time-lines.

Planning can be defined as the process of conducting needs assessments and environmental analyses to identify the agency's strengths, weaknesses, opportunities, and threats; developing missions, goals, objectives and programs; implementing those programs with specific strategies and time-lines; and assessing the overall efficiency, effectiveness, and utility of these programs vis a vis the stated goals and objectives. NTIS 2000 (NTIS 1989b) fails to meet a number of these criteria.

In addition, NTIS 2000 suggests an alarming lack of understanding about user-based program planning and meeting clientele information needs. Instead, it focuses on "things" rather than user information needs and how the R&D community can better use NTIS. Moreover, NTIS 2000 fails to provide performance based objectives so, at a later date, one could assess the degree to which the objectives were, in fact, accomplished.

Space does not permit a formal assessment of either the NTIS 1988 annual report as a report to Congress or NTIS 2000 as a planning document. Indeed,

one wonders what Congressional oversight (if any) or specific feedback was provided to NTIS regarding these documents. Based on the sources of information available to this writer, much work is needed on the part of NTIS to develop an effective annual report, a planning process, and a strategic plan that will assist the agency improve the usability of Federal STI.

Marketing

Deficiencies with accounting and fiscal management also spill over into marketing. Again, our study of NTIS concluded (McClure, Hernon, and Purcell, 1986):

- NTIS sales, services, and marketing information related to academic and public libraries are inadequate (p. 130)
- Existing NTIS library marketing strategies, if they exist, appear to concentrate first on special libraries, secondly on public libraries, and, only in passing, on academic libraries (p. 130)
- NTIS should develop an information system regarding sales, services, and other information related to the marketing of NTIS information services and products (p. 138).

Further, a number of the librarians participating in the study were unfamiliar with NTIS, some who knew of NTIS were unaware of the agency's services and products, and many of those who were aware of the agency suggested that the agency did not project a positive image.

NTIS and its services/products are not as well-known in the STI community as they should be. In 1986 we could not identify a formal marketing/promotion plan that:

- Set forth specific marketing/promotion objectives
- Identified and analyzed the product/service needs of specific target audiences

- Detailed implementation strategies for marketing/promoting NTIS products and services
- Evaluated, on an on-going basis, the success with which the objectives were being accomplished.

It is unclear if such a marketing/promotion plan exists now at NTIS, but such a marketing/promotion plan is needed. There are a number of textbooks available on how to conduct market research and how to implement a marketing plan (e.g., Kotler 1982); NTIS can use formalized marketing approaches to enhance their visibility in the STI community.

The 1988 NTIS annual report states that "NTIS is evaluating and preparing work statements to contract out the functions of the Promotion Division.... NTIS anticipates that new and innovative promotional techniques will increase the sales of the various information products and services" (NTIS, 1989a, p. 13). This effort may be a step in the right direction, but contracting agencies must develop such campaigns in the context of an overall NTIS marketing/promotion plan. NTIS must remain actively involved in overseeing such activities and provide regular and thoughtful input to the contractor.

Staff Training and Knowledge

A final area that might be considered as NTIS moves into the future is the agency's staff skills and knowledge regarding (to name but a few areas):

- Evolving information technologies and their applications
- Scientific communication and research process
- Library and information science
- Information Resources Management
- Information Retrieval.

NTIS has been criticized by some clientele groups for (1) not being up-to-date with the use and applications of new information handling technologies, (2)

having too few staff who have been in "real world" information transfer positions, and (3) being too bureaucratized to respond quickly and effectively to changing clientele needs.

NTIS should consider the appropriateness of a personnel audit that assesses the skills and knowledge that staff will need over the next 10 years to enhance the agency's overall strength and competitiveness. Special attention should be given to technical skills and competencies related to new and evolving information technologies and their applications for STI collection and dissemination. Based on such an assessment, a long range personnel development strategy can be developed.

Importance of Internal Issues

Policymakers should recognize that the internal operations of NTIS can have significant impact on the degree to which the agency collects and disseminates Federal STI effectively. Too often, policy assessments concentrate only on the larger issues such as relationship of NTIS to GPO. But some attention to internal, managerial issues at NTIS is also necessary. This section identifies a number of such issues and suggests how those issues might be addressed.

OVERVIEW OF KEY POLICY ISSUES

Figure 3 summarizes a number of key policy issues related to the future role of NTIS in the collection and dissemination of Federal STI. These issues can be organized in terms of:

- o STI Dissemination Processes
- o Organization of NTIS within the Federal Government
- o Pricing and Fiscal Management
- o Internal NTIS Concerns
- o Other issues.

FIGURE 3

OVERVIEW OF KEY POLICY ISSUES

STI Dissemination Processes

- To what degree does the ambiguous Federal STI policy system injure NTIS' ability to be an effective collector and disseminator of Federal STI?
- How can NTIS move from the traditional model of STI dissemination and product/services development to a user-based model?
- How can NTIS increase the usability and provide appropriate value-added services and products for the technical report literature?
- Should the GPO depository library program take a more active role in the dissemination of Federal STI, in general, and NTIS materials, more specifically?
- Are joint ventures between NTIS and the private sector the most effective means for disseminating Federal STI and to what degree do such joint ventures assist in accomplishing national goals?

Organization of NTIS within the Federal Government

- Should there be a Federal agency with the responsibility for coordinating Federal STI collection and dissemination, and what, specifically, should those responsibilities be?
- Should new enabling legislation be established to specify the role, responsibilities, and programs of NTIS and to clarify the relationship of the agency with other Federal collectors and disseminators of STI?
- How can NTIS better coordinate its collection and dissemination of Federal STI with other collectors and disseminators of Federal STI?

Pricing and Fiscal Management

- To what degree should NTIS treat Federal STI as a public good instead of a commodity? Does treating Federal STI as a commodity limit the degree to which STI can contribute to the achievement of national goals?
- Should NTIS continue as a "self-sufficient" agency, or should Congress provide some regular appropriations to support selected NTIS programs?
- On what basis should NTIS price information services and products for its clientele, and should that basis be the same for services and products developed for or contracted to other Federal agencies?

FIGURE 3 (Continued)

- How effective is the existing NTIS accounting system? How can the accounting system be improved and integrated into other management systems?

- To what degree are NTIS pricing policies compatible with user fee and pricing policy guidelines/regulations with (1) OMB and existing statutes, and (2) those issued by other STI collectors/disseminators?

Internal NTIS Concerns

- To what degree can the mission and goals of NTIS be better focused on specific activities and programs that directly improve the usability of STI?

- How can NTIS be organized to act more like a true information clearinghouse?

- How effective are the existing management information systems in NTIS? What management, planning, and marketing information is needed? How can these management information systems be improved?

- What would constitute an acceptable and effective strategic plan and a marketing plan for NTIS? How soon can such plans be developed and implemented?

- What staff competencies, skills, and knowledges will be needed by NTIS over the next 5-10 years, and how will the agency obtain individuals with those skills?

Other Issues

- How can Congressional oversight for NTIS and the various collectors and disseminators of STI be improved and better coordinated?

- What are the key research questions regarding the collection and dissemination of Federal STI that require attention, how can this research be done expeditiously, and what steps can be taken to ensure that such research is considered in the development of STI policies and procedures?

Overall, these issues suggest that the self-sufficiency mentality for NTIS operations and services hinders the agency's ability to increase the usability of the Federal STI it collects and disseminates. Overall, the agency has become a potpourri of loosely linked programs and activities--many of which cannot be both self-sufficient and serve the public good.

Overriding all the issues discussed in this paper is NTIS' recognition that it "must become more knowledgeable about who its end-users are and what kinds of information products they need" (NTIS, 1989a, p. 15). A better understanding of the information needs and information gathering behaviors of its clientele is essential. Otherwise, the information services and products developed by NTIS may be inappropriate or not needed by the R&D community. Equally important is for NTIS to understand the scholarly communication process, the manner in which the R&D community utilizes STI, and identifying appropriate places in these processes to target specific services and products.

RECOMMENDATIONS

In recent discussions with a number of Federal policymakers, the comment has been made to this writer that "we must find some money-making programs for NTIS to administer." In fact, it is ironic that after Congress "won" the battle not to privatize NTIS, there is the sense that now, something useful and important (and profitable) must be found for NTIS to do!

For example, in this writer's interviews with selected Federal policymakers, the following proposals were been put forth as means by which NTIS can improve its "self-sufficiency:"

- Manage an enlarged and more sophisticated Federal Information Locator System (FILS) as outlined in S. 1742 and H.R. 3695

- Become the Nation's lead agency for identifying, obtaining, organizing, translating, and disseminating Japanese and other foreign STI
- Sell selected NTIS publications to the GPO for inclusion in the Depository Library Program
- Become the lead Federal agency for the development, implementation, and management of the proposed National Education and Research Network (NREN)
- Be a consultant/contractor to other Federal agencies for the design of various software and information technologies.

The mentality, however, of finding more disparate programs for NTIS to administer begs the central policy issues listed in Figure 3.

Instead of simply doing "more of the same," thoughtful and carefully designed research is necessary to address a number of the policy issues outlined in Figure 3. Indeed, these issues can serve as broad problem statements to direct research efforts related to both NTIS and the collection and dissemination of Federal STI. Empirical evidence can be collected to address these issues and develop policies that enhance, rather than limit, the usability of Federal STI.

The requirement for NTIS to establish an advisory board (PL 100-519 and summarized in "National Technical Information Service Advisory Board" [1989]) offers an opportunity for NTIS to better identify and respond to user information needs. However, such an advisory board cannot be passive and must be structured such that its members can be active proponents for improving services and products. At this time, however, it is unclear how the advisory board will be organized, what criteria will be used in selection of members, what its responsibilities will be, and the degree to which NTIS will take its advice seriously.

The issues and options discussed in this background paper suggest that Congressional action is needed to (1) better organize the government to increase the usability of Federal STI, and (2) clarify the role of NTIS in the collection and dissemination of Federal STI. Accomplishing these objectives requires legislation that:

- Clarifies NTIS' mission, provides a focus for what the agency should do, and reconsiders which of the myriad responsibilities that have been given to NTIS are most important
- Formalizes the relationship between and among NTIS with other STI collections/disseminators
- Requires NTIS to utilize modern management practices that include management and accounting information systems, formalized planning and marketing plans, and state-of the art information handling technologies
- Sets forth guidelines for the pricing of NTIS information services and products (in accordance with other generally accepted Federal practices)
- Provides a regular appropriation to NTIS, recognizing that there are costs associated with the management of Federal STI and that it is unrealistic for NTIS to operate on a basis of self-sufficiency.

Such a Congressional initiative, with follow-up oversight, is essential if NTIS is to enhance its ability to collect and disseminate Federal STI, and if it is to maximize the contribution of Federal STI to the achievement of national goals.

NTIS is an essential component in the government's efforts to collect and disseminate Federal STI. But currently, the agency is hobbled by a number of factors that limit its potential. Of most concern is the lack of focus for

agency activities and the requirement that NTIS be self-sufficient. A combination of legislative initiative and internal change within NTIS can resolve these and other issues.

In comments delivered by Congressman Doug Walgren during hearings on the privatization of NTIS, he stated (Congress, 1988, p. 2):

> We must not loose track of everyone's common goal of making NTIS more useful to its customers. NTIS has in its collections a treasure trove of technical information that, if distributed properly, should answer many of the questions American engineers face daily as they try to help their companies compete both at home and abroad.

To accomplish this goal, and others suggested in this background paper, Congress must take a holistic view of STI collection and dissemination and make a serious and concerted effort to revise the existing statutory basis for NTIS, GPO, and other STI collectors and disseminators. To do less is to ensure the continued degradation of Federal STI services and products and to reduce the potential impact of this country's investment in Federal R&D.

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APPENDIX A

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- U.S. Government Information Policies: Views and Perspectives (1989)
- U.S. Government Scientific and Technical Information Policies: Views and Perspectives (1989).
- Public Access to Government Information: Issues, Trends, and Strategies, Second edition (1988).
- Federal Information Policies in the 1980's: Conflicts and Issues (1987)
- Linking the National Technical Information Service with Academic and Public Libraries (1986);
- GPO's Depository Library Program: A Descriptive Assessment (ABLEX, (1985).

He has served as principal investigator for studies related to the management of government information and information policy which were funded by the Office of Technology Assessment, the National Technical Information Service, the Government Printing Office, the National Science Foundation, the Office of Management and Budget, and the Bureau of the Census.

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McClure is also the Associate Editor of Government Information Quarterly for which he served as editor of and contributor to a special issue, "Symposium on the U.S. Office of Technology Assessment Report: Informing the Nation, vol. 6 no. 2 (1989): 129-174.

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As president of Information Management Consultant Services, Inc., he has consulted with a number of academic, public, and special libraries; government agencies; and corporations regarding the design, implementation, management, and evaluation of information services.